Short-term impact of COVID-19 on consumption spending and its underlying mechanisms: Evidence from Singapore

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Abstract. We examine the short-term impact of COVID-19 on consumption spending and its underlying mechanisms using individual-level monthly panel data from Singapore. Although Singapore's case fatality rate was one of the lowest in the world in the early stage of the pandemic (0.05%), we find that the COVID-19 pandemic reduced household consumption spending by almost one quarter at its peak, with a larger response from households with above-median wealth. We show that the reduction in consumption spending is associated with the nationwide lockdown policy, heightened economic uncertainty and reduced income. In addition, we find a substantial increase in monthly savings among households without income losses, suggesting a substantial rebound in consumption spending after the lifting of the lockdown. The results from June 2020 confirm this conjecture, as we find that consumption spending rebounded by about 10 percentage points in that month.

Résumé. Incidence de la COVID-19 à court terme *sur les dépenses de consommation et leurs mécanismes sous-jacents : l'exemple de Singapour*. À l'aide de données de panel mensuelles recueillies au niveau individuel, nous analysons l'impact de la COVID-19 à court terme sur les dépenses de consommation et leurs mécanismes sous-jacents à Singapour. Bien que le taux de létalité dans le pays ait été l'un des plus faibles au monde au début de la pandémie (0,05 %), nous avons observé une diminution de la consommation des ménages de près de 25 % lors du pic épidémique avec une réaction plus importante des foyers à revenus supérieurs à la médiane. Nous montrons que la

baisse des dépenses de consommation est corrélée à la politique de confinement du pays, au contexte économique de plus en plus incertain et à la baisse des revenus. Nous constatons également que la baisse des revenus ne constitue vraisemblablement pas le facteur moteur dans la diminution globale de la consommation. En outre, nous observons une augmentation substantielle de l'épargne mensuelle des foyers n'ayant pas subi de perte de revenus, laissant entrevoir un net rebond des dépenses dès la levée du confinement. Les données de juin 2020 confirment cette hypothèse puisque les dépenses de consommation ont augmenté d'environ 10 % au cours de ce même mois.

JEL classification: E2, I12, H2, J01

1. Introduction

THE OUTBREAK OF the COVID-19 pandemic has led to profound health shocks worldwide, resulting in more than 2.4 million deaths. To contain the virus in the absence of effective drugs and vaccines, many governments have implemented a wide variety of non-pharmaceutical interventions (NPIs) at an unprecedented scale (Hale et al. 2020). Citizens have also been following risk avoidance behaviours such as wearing facial masks and staying at home, even before governments imposed strict social distancing rules.

While these efforts are necessary to contain the pandemic, they can be detrimental to the economy. Initially, COVID-19 contracted household consumption via various channels such as the fear of infection and death, government-imposed NPIs and heightened economic uncertainty. This reduction in consumption lowered firm sales, thereby reducing labour demand and thus household consumption (Guerrieri et al. 2020). Understanding how and why consumption spending has changed during the COVID-19 crisis is critical to mitigate the adverse impact and accelerate economic recovery. This is especially important because the underlying mechanisms of COVID-19's economic impact could be different than those of previous economic crises.

Conventional government stimulus policies during recessions aim to increase households' consumption spending via cash transfers. During a typical economic downturn, households experience negative income shocks and lower their expectations about the future economy, leading to a decline in consumption spending. In the current COVID-19 related recession, households may have decreased consumption spending because of government lockdown policies in addition to conventional channels. If risk avoidance behaviour and the lockdown of the economy play a significant role in consumption spending, conventional stimulus packages would be less effective than expected. Although many studies have examined the economic effects of COVID-19, there is limited evidence on the extent to which income reductions and the other channels stated above explain how COVID-19 affects consumption spending.

We address this gap in the literature by estimating the impact of the COVID-19 outbreak on consumption spending and investigating its underlying mechanisms using individual-level monthly panel data of Singaporeans

primarily between 55 and 75 years of age from the Singapore Life Panel (SLP). For the identification, we employ a difference-in-differences (DID) model. We compare the month-on-month changes in consumption spending, household income, savings, mobility and perceived uncertainty about the future economy for the same individuals in the 2019–2020 season with those changes one year before.[1] In the baseline analysis, we demonstrate the dynamic impact of COVID-19 on consumption spending, household income and other potential mechanisms. We also examine the heterogeneous impacts by household wealth and underlying health status. Furthermore, since the data track individuals' income and consumption spending simultaneously, we quantify the significance of an income reduction on consumption spending by comparing the changes in consumption spending between those who experienced a reduction in household income during the COVID-19 outbreak and those who did not.

Our main findings are as follows. First, although Singapore did not experience a high death toll (it reported a case fatality rate of about 0.05%), we find that it suffered profound economic disruption. Total consumption spending in 2020, as compared with the previous year, decreased by 7.3% in February, 9% in March and then plummeted by 22.6% in April and 24.3% in May during the nationwide lockdown period. After the lifting of the lockdown policy in June, consumption spending rebounded by approximately 10 percentage points. Our heterogeneity analysis indicates that households with above-median net worth reduced their spending more than households with below-median net worth. Richer households' spending responses are driven mainly by sharp reductions in discretionary spending involving travel and physical interactions.[2] In addition, we expected to see a larger reduction in consumption among households with members having chronic conditions (e.g., cancer and diabetes) than households without members having chronic conditions because these conditions increase the risk of severe illness due to COVID-19 (U.S. National Center for Immunization and Respiratory Diseases 2020). However, we find only small and statistically insignificant differences due to underlying health status.

Second, we investigate changes in mobility, expectations of the future economy and household income to examine the underlying mechanisms. We find that the pandemic reduced average household income by 8% at its peak in May 2020, driven mainly by decreases in labour income. We also provide evidence that individuals reduced: (i) the frequency of going out every day by

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1 We define a "season" as the period from July in the previous year to June in the current year.

2 Given that pre-COVID-19 consumption spending among wealthy households was higher than those among poorer households, a larger percentage reduction implies an even larger decline in spending. Therefore, the overall reduction in consumption spending is driven largely by wealthy households.

over 10% in April and over 30% in May and June and (ii) their expectations about future job losses by over 4 percentage points throughout April to June (thereby increasing the precautionary saving motive).

Third, to investigate the role of income reductions on consumption spending, we estimate the heterogeneous effects of COVID-19 on consumption spending by households' income loss experience. We find that consumption spending decreased more among households experienced larger income reductions during the pandemic. In addition, we find little evidence that local travel behaviour (a proxy for risk avoidance behaviour) and subjective probability of job losses (a proxy for economic uncertainty) vary by the degree of income losses. The results imply that the difference in consumption spending is due largely to the income channel.

Our findings provide several policy implications. First, subsidies that decline with households' income are likely to be more efficient in stimulating the economy than across-the-board income grants. The drop in consumption by relatively wealthy households is less likely due to increased liquidity constraints, and such households even increased their savings during the pandemic. Second, the government's labour market support programs will play a critical role in maintaining household consumption levels, especially for disadvantaged populations whose incomes are less likely to be insured against income shocks. Third, alleviating the perceived uncertainty about the pandemic and future economic conditions among the general public can be important for economic recovery. Fourth, while consumption reductions due to risk avoidance and social distancing policies may be unavoidable until vaccines are developed, the temporary decrease in consumption will largely be compensated in the future among those who did not experience income losses owing to their increased savings.

This study contributes to the rapidly growing literature on the economic impact of COVID-19 and identifies its differences with that of typical economic crises (Cynamon and Fazzari 2016). Several studies have examined consumer behaviour during the COVID-19 pandemic using financial transaction data (Andersen et al. 2020, Baker et al. 2020, Carvalho et al. 2020, Chen et al. 2020, Coibion et al. 2020, Surico et al. 2020). The reduction in consumption spending ranges from 25% in Denmark to nearly 50% in Spain, while the declines in China and the United States are slightly above 30%, and the United Kingdom has experienced a 41% decrease. Since our panel survey data jointly track the same individuals' information on household income, consumption, economic uncertainty and mobility, we can provide evidence on the underlying mechanisms behind changes in consumption spending after the outbreak of COVID-19. By jointly tracking the monthly changes in household income and consumption spending of the same household before and during the pandemic, typically unavailable in ad hoc post-COVID-19 surveys and financial transaction data, we assess how the impact of COVID-19 on consumption varies by households' income loss experiences. Our results imply that other factors such as expectations, risk avoidance behaviour and lockdown policies

have played a more significant role in consumption responses than income reductions, at least in the short term.[3] The estimated consumption reduction resulting from COVID-19 is larger than that during previous economic crises because people without liquidity constraints are also reducing consumption spending as a result of risk avoidance behaviour and social distancing policies. This finding provides insights for researchers and policy-makers to understand the changes in consumption spending during the pandemic and provides useful information about governments' post-coronavirus recovery policies.

The remainder of the study is structured as follows. Section 2 presents the overview of the COVID-19 outbreak in Singapore. Sections 3 and 4 present the data and empirical strategy. Section 5 discusses the results, and section 6 concludes.

2. Overview of COVID-19 outbreak in Singapore

The first novel coronavirus case in Singapore was confirmed on January 23, 2020, a Chinese traveler from Wuhan. The government responded to the spread of the infection by raising risk assessment to its second highest level on February 7. As shown in panel A of figure A1, the situation remained stable until the end of March 2020, with 926 confirmed cases. During this phase, the government's containment efforts focused on minimizing imported cases through border restrictions and restraining local transmission by strengthening surveillance, meticulous contact tracing and isolation procedures.[4] In addition, to protect the vulnerable elderly population, the government suspended all group activities for seniors by public agencies from March 11, 2020.

However, by mid-April, the number of confirmed cases exploded as the contagion remained unchecked in the high-density dormitories of low-wage migrant workers. By August 17, 2020, the number of confirmed cases had surged to 55,838, with 95% of the cases concentrated in low-skilled migrant workers' dormitories.[5] To address the spike in confirmed cases in April, the Singapore government imposed a set of nationwide partial lockdown policies, called the circuit breaker (CB), initially from April 7 to May 4, 2020. During the CB period, there were restrictions for workers in "non-essential services" to work from home and all schools were closed. Only "essential" services,

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3 However, if the decline in consumption persists for a longer period, more workers would be laid off or have their salaries cut. Thus, income losses would have a larger impact.

4 For example, inbound flights from Wuhan were banned from January 23, 2020. Chinese visitors and non-citizens who had visited China 14 days before their arrival were banned from entering Singapore on February 2, 2020. Residents returning from China after February 19 were ordered to stay home for two weeks.

5 Singapore's total population in 2019 was about 5.7 million (Singapore Department of Statistics 2020).

deemed as such by the government, that is, healthcare (excluding non-urgent care), transportation, restaurants (delivery and take-away orders) and groceries, were allowed to operate. No social gatherings were allowed outside the household. One week after the CB, daily bus and subway ridership plummeted by 71% and 75%, respectively (Singapore Land Transport Authority 2020). On April 14, the government made the wearing of face masks mandatory and imposed a full lockdown on foreign worker dormitories. Nevertheless, the number of daily confirmed cases continued to remain high. Hence, on April 21, the government extended the CB until June 1.

A unique aspect of Singapore's COVID-19 situation is the persistently low mortality rate. Panel B of figure A1 illustrates the trend of cumulative deaths due to COVID-19. The first two deaths were reported on March 21. Since then, the number of confirmed cases exploded to over 56,000. Yet, the COVID-19 case fatality rate was only 0.05% (27 deaths), much lower than the worldwide mortality rate of around 4% (World Health Organization 2020). This is because the infected migrant workers, who accounted for most of the confirmed cases, were primarily young and healthy. In addition, the government quickly built community care facilities for COVID-19 positive patients with mild or no symptoms to prevent hospitals from becoming overcrowded.

To minimize the adverse economic impact of COVID-19, the Singapore government has introduced a set of relief measures such a: (i) direct wage subsidies (up to 75% of the first S$4,600), (ii) a cash transfer of S$600 to $1,200 depending on income and property value,[6] (iii) ad hoc unemployment benefits of S$800 a month,[7] (iv) a S$1,000 monthly payout for the eligible self-employed for nine months and (v) a S$2 billion package to create 40,000 jobs. Together, these measures amount to over 20% of Singapore's GDP in 2019. The details of the government's COVID-19 support programs are provided in appendix B.[8]

3. Data

Since July 2015, the SLP has surveyed nationally representative cohorts of middle-aged and older Singapore residents (i.e., those aged 55 to 75). It captures a rich set of data on spending, labour market activities and other individual and household characteristics on a monthly basis. Additional questions

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6 1 SGD was equivalent to 0.72 USD (or 0.63 EUR) as of June 9, 2020.

7 Singapore does not operate a public unemployment insurance program.

8 Estimating the marginal propensity to consume (MPC) out of those programs would be of great interest to both policymakers and researchers. Unfortunately, it is difficult for us to isolate spending responses to the COVID-19 support programs from the impact of COVID-19 because the disbursements of stimulus payments are likely to be associated with the severity of the COVID-19 situation.

related to social activities, subjective expectations of job loss possibility and household assets and debts are asked on a quarterly or an annual basis.

The use of the SLP for studying the impact of COVID-19 has several advantages. First, it tracks the same individuals before and during the pandemic on a monthly basis. The high-frequency nature of the data allows us to investigate the dynamic impact of the pandemic. Second, it collects a vast array of information on individual characteristics such as risk avoidance behaviours, chronic health conditions, health literacy and demographics, enabling us to assess the heterogeneous impact of the pandemic and potential mechanisms. Third, as opposed to other in-person surveys, the SLP is conducted online. Hence, participation is not disrupted by the pandemic, especially when physical mobility is restricted.[9]

As the primary dependent variables, we construct several categories of monthly household consumption spending (total, durables and non-durables) and saving, defined as household income net of total spending at the household level, by combining information collected across more than 40 spending subcategories. When constructing our household consumption spending measures, we use the information reported by each household's financial respondent, who is confident about reporting the household's financial information.[10] We assume that the information provided by the financial respondent is more accurate than that reported by other household members. However, the results are robust when using the consumption spending measures reported by other household members.

To examine the income channel, we examine changes in households' income components such as individual labour income, spousal labour income (if married), other income, private transfers from other family members and total household income. Additionally, to examine individuals' risk avoidance behaviours and expectations, we use information on the frequency of leaving the home daily during the last month and subjective probability of losing one's job.

As the control variables, we use only time-varying individual characteristics such as age, age squared, marital status and household size because we include individual fixed effects in our regression analysis. For the heterogeneity analysis, we use information on the household's net worth and chronic health conditions. Household net worth is computed as total assets net of total debts.[11] Chronic conditions include the following diseases: cancer, diabetes, stroke, heart problems, hypertension, arthritis and psychiatric problems. The

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9 The SLP also conducts telephone surveys for those who do not have access to the Internet or who are not familiar with a computer/smartphone.

10 Unlike other household survey data, the SLP does not designate a household head or representative person.

11 The SLP measures household assets and debts once a year in January. We use average household net worth between January 2018 and January 2020.

monetary units are in 2019 Singapore dollars and transformed into logarithm values, unless specified otherwise.[12] The details of the variable definitions are included in appendix C.

We use SLP data from July 2018 through July 2020. As respondents report monthly consumption spending and income from the previous month, our analysis includes information up to June 2020. Table A1 presents the summary statistics of our study sample as of January 2020. The mean age of the sample is 63.2 years. About 42% and 36% of the sample completed secondary and tertiary education, respectively. Nearly 87% of respondents are ethnic Chinese and 79% are married. The average number of children is 2.9, while the average number of people living in the same household is 2.6. Around 48% and 8% of respondents are employed in a paid job and self-employed, respectively. The proportion of the working population is low because SLP respondents are old, reflecting the sampling feature of the survey. Among employed respondents, 71% are full-time workers with an average monthly labour income of S$3,642. Average total monthly consumption spending and total household monthly income are S$2,998 and S$4,797, respectively. About 65% of the sampled individuals have at least one chronic health condition. Columns (2) and (3) provide the summary statistics in May 2020 and January 2019. We find little difference in characteristics such as education, marital status, number of children, household size and ethnicity, suggesting no significant sample attrition.

4. Empirical strategy

To identify the impact of the COVID-19 outbreak, we examine how consumption spending and other outcomes of interest evolved relative to January 2020, as Singapore's first COVID-19 case was confirmed on January 23, 2020. Since approximately 90% of the respondents had completed the January survey by that date, January 2020 serves as the reference period. Specifically, we use the changes in the outcome variables of the same individuals from July 2018 to June 2019 (i.e., the same months in the previous years) to analyze what would have happened in the absence of the pandemic. To implement this research design, we consider the following DID specification:

$$y_{i,t} = \beta_0 + \beta_1 Season_t + \sum_{k \neq Jan} \beta_k 1[Mth_t = k]Season_t + Mth_t + \lambda_i + X'_{i,t}\gamma + \varepsilon_{i,t}, \quad (1)$$

where $y_{i,t}$ represents the outcome variable of interest of the household (for consumption spending and household income) and individual i (for risk avoidance behaviour and subjective expectation) in month t. Mth_t are

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12 We show the results using levels to account for the zero values in panel B of table A2.

month dummies. $Season_t$ is a dummy variable indicating if the observed period is the 2019/2020 season. λ_i denotes individual fixed effects. $X_{i,t}$ includes the abovementioned control variables. The β_k s are the parameters of interest that capture the impact of COVID-19 on the outcomes of interest during each month evaluated against those in January. For the statistical inference, we calculate standard errors clustered at the household level for consumption spending and household income and at the individual level for the other individual-level outcomes.

The key identification assumption of the DID specification is that the trends of the outcome variables would have been identical between the two seasons in the absence of the COVID-19 pandemic. To indirectly test this assumption, we examine if the β_k s, where k refers to the months from July to December, are close to zero and statistically insignificant.

5. Results

5.1. Short-term impact of COVID-19 on consumption spending

Figure 1 shows the DID estimates of the impact of COVID-19 on consumption spending.[13] Panel A indicates that the estimated changes in total consumption spending are mostly small in magnitude and statistically insignificant until January 2020, which provides evidence of the parallel pre-pandemic trends. Subsequently, total household consumption spending began to decline from February 2020 onward. The decreases in total household consumption spending from February to May 2020 are 7.2%, 8.9%, 22.6% and 24.3%, respectively. Then, consumption spending rebounded by 10 percentage points to 14.2% in June after the lifting of the Circuit Breaker. The massive decline in total household spending during April and May reflects the strict nationwide lockdown, increased risk avoidance behaviour and heightened economic uncertainty due to the spike in the number of confirmed cases.

In panels B and C, we examine consumption spending responses for durable and non-durable (including services) goods, respectively. We find that durable goods spending remained constant until March but declined by 20.2% in April and further declined by 33.1% in May. The late decline in durable goods spending is probably because consumers could not physically visit stores to inspect durable goods (e.g., home appliances and furniture) before purchasing them because of the nationwide lockdown imposed in April 2020. By contrast, spending on non-durables decreased by 7.8% in February, 9.5% in March, 22% in April and 23.4% in May. After the lifting of the lockdown, expenditure on durables and non-durables rebounded by 48% and 37%, respectively. Figure A3 shows that the estimated cutback in consumption

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13 The corresponding regression results are reported in panel A of table A2. The trends of consumption spending (both in logarithm and in levels) are reported in figure A2.
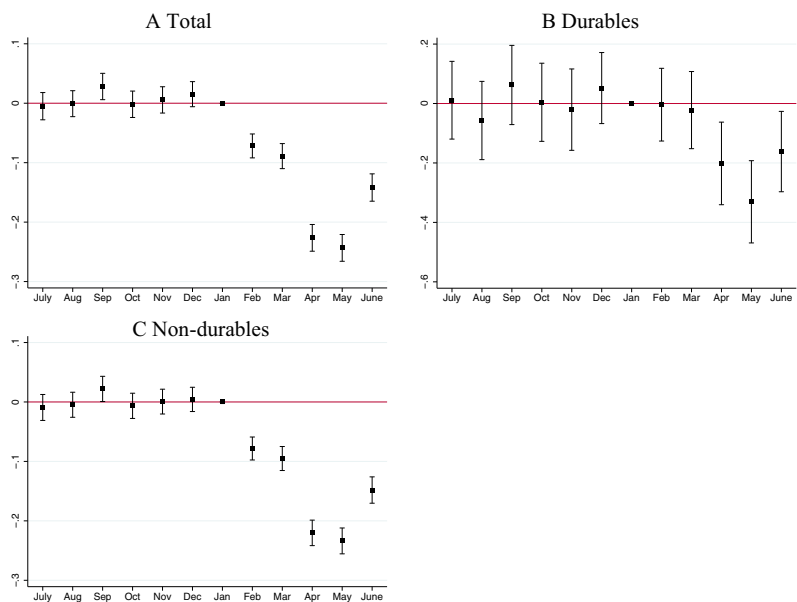
FIGURE 1 Short-term impact of COVID-19 on household consumption spending
NOTES: The dependent variables are log transformed. Square dots represent point estimates. Caps indicate 95% confidence intervals. Standard errors are clustered at the household level and corrected for heteroskedasticity. [Color figure can be viewed at `wileyonlinelibrary.com`]

spending varied by subcategory.[14] For example, there were substantial declines in entertainment (e.g., movies and concerts) (–83%) as well as tours and vacations (–153%). By contrast, spending on food and beverages purchased from grocery stores and supermarkets increased by 13.6%, while spending on food and beverages purchased from restaurants and food courts decreased by 32.2%.

In figure 2, we investigate the heterogeneous consumption responses to COVID-19 based on the presence of chronic health conditions and average household net worth from January 2018 to January 2020. Panel A indicates that although physically vulnerable households reduced their consumption spending slightly more than less vulnerable households, the difference is not

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14 We calculate the percentage change for each subcategory between January and April 2020. We estimate equation (1) using consumption spending by category in levels. Next, we divide the estimated coefficient estimates of April 2020 by average spending in the same category in January 2020. Hence, the calculated percentage change could be larger than 100%. We use the regression of consumption spending in levels instead of logarithm because of the presence of many zero values, especially for durables and items such as tours, entertainment and petrol (the car ownership rate in Singapore is only about 11%).
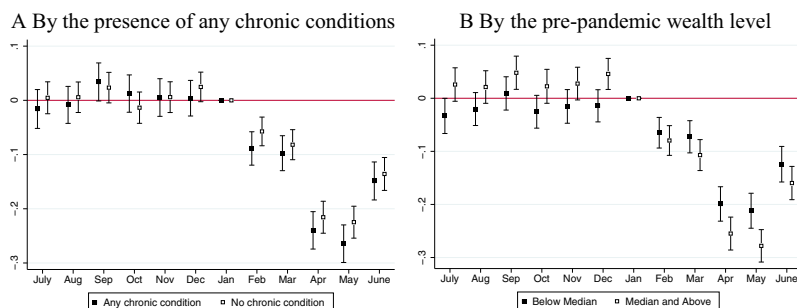
A By the presence of any chronic conditions

B By the pre-pandemic wealth level

FIGURE 2 Heterogeneous impact of COVID-19 on total consumption spending
NOTES: The dependent variables are log transformed. Square dots represent point estimates. Caps indicate 95% confidence intervals. Standard errors are clustered at the household level and corrected for heteroskedasticity. [Color figure can be viewed at `wileyonlinelibrary.com`]

statistically significant.[15] We argue that this finding can be attributed to the following two reasons. First, since SLP respondents are middle-aged and older people, their desire to avoid the coronavirus infection may be similar, regardless of pre-existing chronic conditions. Second, given the low case fatality rate in Singapore, households' consumption responses are likely to be more affected by other factors such as the lockdown policy and changes in expectations and precautionary motives than the actual threat to health.

We estimate the heterogeneous consumption responses by wealth because low-wealth households (i.e., those with below-median household net worth) may experience severe financial hardship during recessions and reduce their expenditure relatively more than high-wealth households. However, panel B shows a 5.6 percentage point greater reduction in consumption spending among households with greater wealth in April and a 6.6 percentage point greater reduction in May 2020. In addition, to further examine the more granular differences in spending responses by wealth, figure A4 plots the estimates of the average household consumption spending reduction during the COVID-19 period (February to June 2020) in each wealth decile. It shows that the reductions in consumption spending are greater among wealthier groups.

Then, we estimate the MPC during the COVID-19 pandemic by running a series of regressions of household spending on household income each month during the COVID-19 period after controlling for the household characteristics used in the main specification. Table A3 shows that the estimated MPCs are 34.6%, 29.6%, 26.8% 26.7% and 29.4% in February, March, April, May and June 2020, respectively. To benchmark the size of spending changes during the COVID-19 pandemic, we compared our estimates with the estimates of spending responses to tax rebates in the US during the previous recessions.

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15 The results, available upon request, are similar when estimating the heterogeneous effects by age.

Johnson et al. (2006) and Parker et al. (2013) showed that the three-month MPCs of the 2001 and 2008 tax rebates were approximately 20% to 40% and 50% to 90%, respectively. This implies that the size of the MPC estimate in this study is similar to or smaller than those of the 2001 and 2008 tax rebates. By contrast, our MPC estimate is significantly larger than the implied MPC out of a transitory income shock (5.3%), documented by Blundell et al. (2008). However, we acknowledge that our MPC estimates during the COVID-19 period could be biased because income changes during the pandemic could have been affected by other unobservable characteristics. In addition, the MPC estimate during the pandemic could be different from the MPC estimates from other settings because of governments' NPIs and individuals' risk avoidance behaviour.

5.2. Mechanisms

The COVID-19 pandemic can reduce consumption spending via various channels. First, an unexpected decrease in household income (via layoffs, unpaid leave and lower wages) tightens budget constraints. Second, people are less likely to leave their homes in order to avoid the risk of infection and because of the nationwide partial lockdown policy, thereby spending less. Third, people become more cautious because of heightened economic uncertainty and thus increase their savings. Although we cannot quantify the relative importance of each mechanism, we exploit the rich information in the SLP and the COVID-19 pandemic timeline in Singapore to identify the major mechanisms.

First, households may reduce consumption spending because of the unexpected decrease in total household income following a decline in labour income or other income sources. Figure 3 shows the decomposition of household income by source. Panels A and B demonstrate that the monthly labour income of financial respondents and their spouses (if married) decreased by around S$150 from April to June. Panel C shows that COVID-19 increased households' other income (including public transfers) by almost S$50 from April to June, reflecting the Singapore government's income-support programs.[16] Consequently, panel E shows that household income decreased by over S$200 in April and nearly S$200 in June. In the absence of government cash transfers in May, average household income declined by over S$350.[17] Panel E also indicates that the household income reduction lagged the consumption reduction by one month.

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16 The Care and Support program provided cash grants to eligible Singaporeans worth S$900, S$600, or S$300 depending on one's income and housing value. Of this amount, S$300 was first paid in April 2020. The remaining amount was paid on June 18, 2020 (Singapore Ministry of Finance 2020).

17 The negative coefficients on household income before January are driven mainly by private transfers received from relatives and friends, which tend to peak in January (panel D).
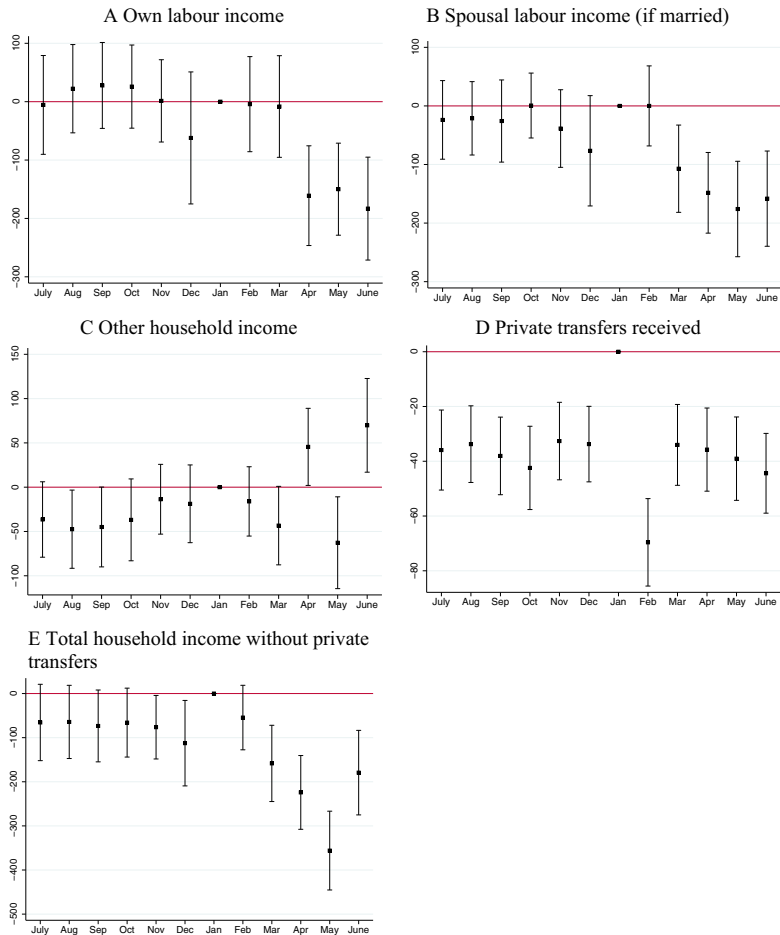
FIGURE 3 Short-term impact of COVID-19 on household income by source
NOTES: We use income reported by households' financial respondents. Zero incomes are included in all four sources. Total household income without private transfers includes three parts: households' financial respondents' own income, their spousal income and households' other income. Square dots represent point estimates. Caps indicate 95% confidence intervals. Standard errors are clustered at the household level and corrected for heteroskedasticity. [Color figure can be viewed at `wileyonlinelibrary.com`]

Second, spending may decline when fewer people leave their homes. Consistent with this conjecture, panel A of figure 4 shows that individuals reduced the frequency of going out over the last month, which implies that they deliberately cut back on outdoor activities. This result is consistent with the large decline in spending on public transportation in panel B. We attribute the initial decline in consumption spending in February and March 2020 to individual choices and the larger decline in April and May 2020 to a mix of individual choices and the government's lockdown policy. Although Singapore

lifted the lockdown policy in June, the estimated consumption response in June reflects the gradual reopening of the economy and remaining social distancing policies.

Third, spending may decline when individuals become more uncertain about their future economic status and, therefore, increase precautionary savings. Consistent with this conjecture, panel C in figure 4 shows that the subjective probability of losing a job increased by 4 percentage points in April 2020 and remained high in May and June 2020. In addition, panel D provides evidence that households significantly increased savings following the outbreak of COVID-19, but we acknowledge that part of this saving increase could be due to the restrained consumption spending caused by risk avoidance behaviour and the government's NPIs.[18]

5.2.1. The role of the income channel during the COVID-19 outbreak

We investigate the role of income shocks on the consumption spending reduction. We split the sample into the deciles of household income losses.[19] Since retirees were less likely to experience income losses during the COVID-19 pandemic, their consumption spending could therefore be different than that of households with working individuals. Thus, in this analysis, we excluded those households with retirees from the sample.[20]

Panel A of figure 5 shows the average income loss of each decile. We find that most income losses are concentrated in the two lowest deciles. The third to ninth deciles show little changes, while we observe a large increase in household income in the tenth decile. Consistent with the income loss distribution, in panel B, the two lowest deciles also exhibit the largest spending reductions during the COVID-19 period. As the income losses decrease (the third decile to fifth decile), the spending reductions also decrease until they stabilize in the sixth to tenth deciles.

To further understand the difference in consumption reductions by households' income losses due to the income channel or other channels, figure 6 shows the heterogeneous effects on the possible mechanisms by income loss status. We find little differential reduction in the probability of leaving home

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18 We do not report the results using the logarithm value of saving, as nearly 20% households reported zero or negative saving. However, the results, available upon request, are robust when using the log transformation of saving that excludes non-positive values.

19 We calculate households' average monthly income between September 2019 and January 2020 and between February 2020 and June 2020. If a household's post-pandemic average income is lower than its pre-pandemic income, we treat this household as one experiencing an income loss.

20 We define a household with retirees as one in which no members undertook paid work for at least one of the five months before the COVID-19 outbreak (September 2019 to January 2020).
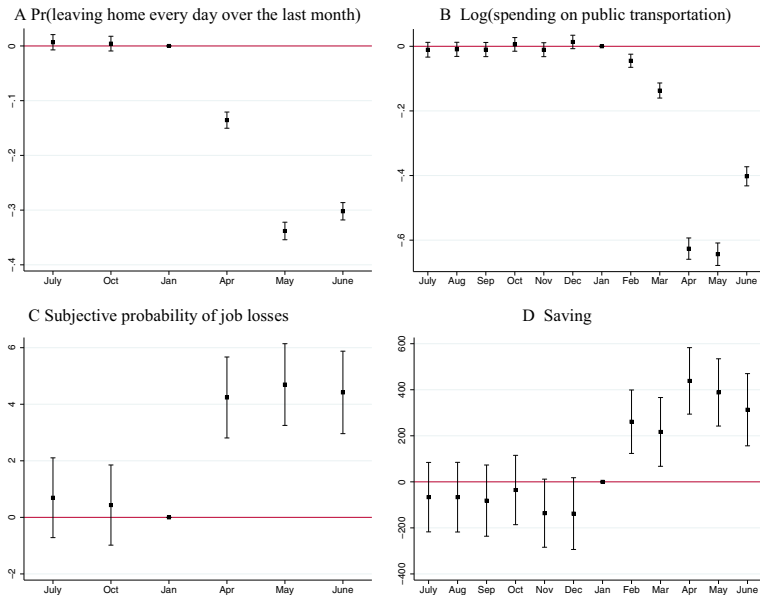
FIGURE 4 Short-term impact of COVID-19 on other possible mechanisms
NOTES: Square dots represent point estimates. Caps indicate 95% confidence intervals. Standard errors are clustered at the household level in panels B and D and at the individual level in panels A and C and corrected for heteroskedasticity. [Color figure can be viewed at `wileyonlinelibrary.com`]
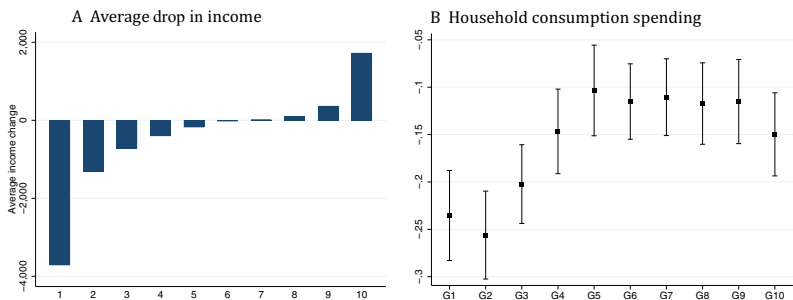

FIGURE 5 Changes in income and consumption spending during the COVID-19 pandemic by income loss decile
NOTES: We excluded households with retirees from the sample. In panel B, the square dots indicate the coefficient estimates of average reductions in total household consumption spending during the COVID-19 period in each income loss decile. Caps indicate 95% confidence intervals. Standard errors are clustered at the household level and corrected for heteroskedasticity. [Color figure can be viewed at `wileyonlinelibrary.com`]

in panel A, although larger reductions in spending on public transportation are observed by households with greater income losses in panel B. In addition, we find little heterogeneity in terms of the subjective probability of job losses by income loss status in panel C. Panel D demonstrates that households
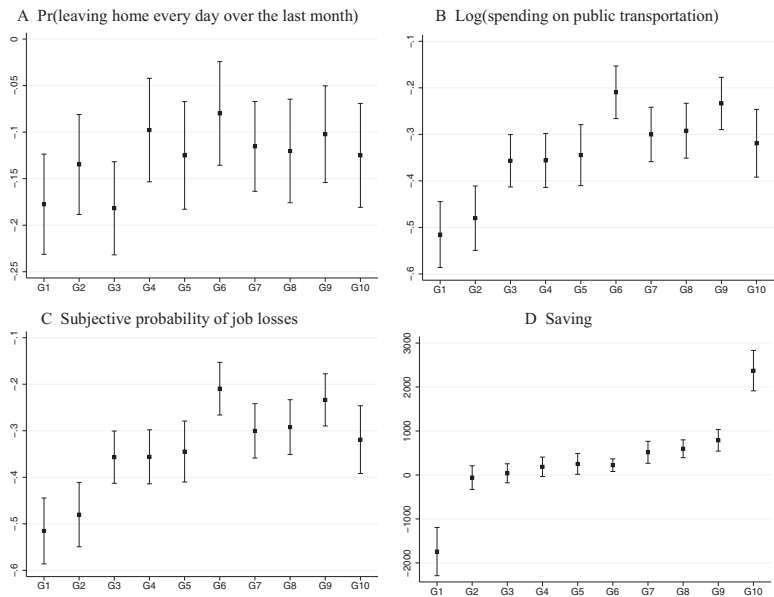
FIGURE 6   Short-term impact of COVID-19 on other possible mechanisms by income loss
status

NOTES: We excluded households with retirees from the sample. Total household income
without private transfers includes three parts: households' financial respondents' own income,
their spousal income and households' other incomes. Square dots represent point estimates.
Caps indicate 95% confidence intervals. Standard errors are clustered at the household level in
panels B and D and at the individual level in panels A and C and corrected for
heteroskedasticity.

without income losses significantly increase savings, whereas households with
significant income losses reduce savings. We cannot distinguish if this differ-
ence is due to income shocks or different precautionary saving motives. How-
ever, panel C shows that households maintain similar levels of perceived
uncertainty about their future job status regardless of the magnitudes of
income losses, implying little heterogeneity in precautionary saving motives.

We find consistent evidence that households that experienced greater
income losses during the COVID-19 outbreak decreased overall consumption
spending by about twice as much as their counterparts with no or smaller
income loss. Given the lack of heterogeneity in home-leaving behaviour (risk
avoidance) and subjective probability of job losses (uncertainty), we attribute
the difference in consumption spending mainly to the income channel.

5.2.2. Mechanisms behind the heterogeneous consumption responses by household wealth

In section 5.1, we showed that high-wealth households reduced consumption
spending relatively more than low-wealth households during the pandemic in
contrast to the consumption responses during a typical economic recession.

We conjecture that there are three possible explanations for this result: (i) a relatively large reduction in discretionary spending by higher-wealth households (e.g., travel, sports and entertainment),[21] (ii) a higher return to health capital among higher-wealth households, resulting in a stronger incentive for them to take precautions against the virus and reduce the frequency of going out, and (iii) those with greater wealth tend to have better health literacy and thus may minimize consumption that involves close personal interactions. Panels A to C of figure A5 present evidence consistent with our conjectures.

The higher reduction in consumption spending among wealthier households is less likely to be driven by higher income reductions among them because their occupations (e.g., office work) are more likely to have been secure during the pandemic. Panel D of figure A5 indicates that labour income reductions are not lower among wealthier households. Panel E demonstrates that government cash transfers (captured by households' other income) played an important role in mitigating the negative income shocks among low-wealth households. In general, these government subsidies helped low-wealth households maintain similar overall income shocks as high-wealth households, as depicted in panel F. Additionally, although we expect low-wealth individuals to be more uncertain about their job security and thus have stronger precautionary saving motives, we do not find such a difference in panel G of figure A5.

The similar reductions in household income and similar perceptions of economic uncertainty, but distinct reductions in consumption spending imply that savings increase disproportionate to wealth. The trend of household saving by household net worth in panel H confirms this hypothesis.

6. Conclusions

We examine the short-term impact of COVID-19 on consumption spending and its underlying mechanisms using individual-level monthly panel data from Singapore. Although Singapore's case fatality rate is one of the lowest in the world (0.05%), the COVID-19 pandemic has substantially reduced consumption spending, with a larger response from wealthy households. We show that the reduction in consumption spending is associated with the nationwide lockdown policy, heightened economic uncertainty and reduced income. We find evidence that households with greater income losses experienced larger reductions in consumption spending. As alternative hypothesis, we find little evidence that households' risk avoidance behaviour and expectation on the future economic conditions play significant roles in reducing household consumption spending. In addition, we find a substantial increase in monthly

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21 Discretionary spending includes expenditure on entertainment, sports, hobbies, tours, public transportation, petrol, clothing and home repairs and maintenance. The results are robust if we include durables in discretionary spending.

savings (e.g., S\$700 or US\$510 in April and May 2020) among households without income losses. Thus, when lockdown policies are lifted, we expect to see a substantial rebound in consumption spending, even though it is unlikely to return to the pre-COVID-19 level because of lowered expectations of economic growth and risk avoidance behaviour. Early results from June 2020 confirm this conjecture, as consumption spending rebounded by approximately 10 percentage points.

Our findings provide the following policy implications. First, the government's labour market support programs could play a critical role in maintaining household consumption levels for the disadvantaged population whose incomes are less likely to be insured against adverse income shocks. Second, given that low-income households experienced larger income losses and high-wealth households experienced a larger reduction in consumption spending, uniform cash transfers are less effective than transfers favouring low-income households. Third, although lifting the lockdown can help the economy rebound to a large extent, individuals' risk avoidance behaviour and the grim economic outlook could be stumbling blocks to returning the economy to the pre-pandemic level. Therefore, it is important to contain the fear of the virus and boost confidence in the economy to minimize the long-term adverse economic consequences of the pandemic.

We acknowledge the following limitations of our study. First, we focus on the short-term economic impact of COVID-19. Investigating the long-term impact would be an interesting avenue for future research to understand the evolution of the pandemic responses and role of stimulus policies. Second, our analysis focuses on middle-aged and older individuals, who are more vulnerable to COVID-19 in terms of the health impact. Given the lack of access to data covering the entire Singapore population, we should be cautious about generalizing our study results to younger groups.[22]

Supporting information

Supplementary material accompanies the online version of this article.

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22 Our consumption spending estimates may be underestimated since in some households, older members are retired and less likely to experience income reductions. To examine this issue, we estimate the heterogeneous effects on consumption spending by age because younger individuals are more likely to stay in the labour market. The results, however, indicate little difference by age, implying that our baseline estimates are unlikely to be understated.

References

Andersen, A.L., E. T. Hansen, N. Johannesen, and A. Sheridan (2020) "Consumer responses to the COVID-19 crisis: Evidence from bank account transaction data," CEPR discussion paper no. DP14809

Baker, S.R., R. A. Farrokhnia, S. Meyer, M. Pagel, and C. Yannelis (2020) "How does household spending respond to an epidemic? Consumption during the 2020 COVID-19 pandemic," NBER working paper no. w26949

Blundell, R., L. Pistaferri, and I. Preston (2008) "Consumption inequality and partial insurance," *American Economic Review* 98(5), 1887–921

Carvalho, V.M., J. R. Garcia, S. Hansen, A. Ortiz, T. Rodrigo, J. V. R. Mora, and J. Ruiz (2020) "Tracking the COVID-19 crisis with high-resolution transaction data," Cambridge Working Papers in Economics, no. CWPE2030

Chen, H., W. Qian, and Q. Wen (2020) "The impact of the COVID-19 pandemic on consumption: Learning from high frequency transaction data," SSRN working paper no. 3568574

Coibion, O., Y. Gorodnichenko, and M. Weber (2020) "The cost of the COVID-19 crisis: Lockdowns, macroeconomic expectations, and consumer spending," NBER working paper no. w27141

Cynamon, B.Z., and S. M. Fazzari (2016) "Inequality, the great recession and slow recovery," *Cambridge Journal of Economics* 40(2), 373–99

Guerrieri, V., G. Lorenzoni, L. Straub, and I. Werning (2020) "Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages?" NBER working paper no. w26918

Hale, T., N. Angrist, B. Kira, A. Petherick, T. Phillips, and S. Webster (2020) "Variation in government responses to COVID-19," Blavatnik School of Government working paper

Johnson, D., J. Parker, and N. Souleles (2006) "Household expenditure and the income tax rebates of 2001," *American Economic Review* 96(5), 1589–610

Parker, J., N. Souleles, D. Johnson, and R. McClelland (2013) "Consumer spending and the economic stimulus payments of 2008," *American Economic Review* 103(6), 2530–53

Singapore Department of Statistics (2020) "Population and population structure," infographic. Available at `www.singstat.gov.sg/modules/infographics/population`

Singapore Land Transport Authority (2020, April 14) "Changes to public bus and train operating hours and frequency," news release. Available at `www.lta.gov.sg/content/ltagov/en/newsroom/2020/4/news-releases/Changes_to_public_bus_and_train_operating_hours.html`

Singapore Ministry of Finance (2020, June 4) "Budget 2020 care and support – Cash to be paid from 18 June 2020," press release. Available at `www.mof.gov.sg/news-publications/press-releases/budget-2020-care-and-support-cash-to-be-paid-from-18-june-2020`

Surico, P., D. Känzig, and S. Hacioglu (2020) "Consumption in the time of COVID-19: Evidence from UK transaction data," CEPR discussion paper no. 14733

U.S. National Center for Immunization and Respiratory Diseases (2020) "Coronavirus disease 2019 (COVID-19): People with certain medical conditions," Centers for Disease Control and Prevention COVID-19 website.

Available at `www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html`

World Health Organization (2020) "Coronavirus disease (COVID-2019) situation reports." Available at `www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports`